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(71) Applicant

Vee-Con Plastics Limited (United Kingdom),  
16 The Parade, Brighton Road, Borough Heath,  
Tadworth, Surrey

(72) Inventor

Ronald Henry Sayers

(74) Agent and/or Address for Service

Urquhart-Dykes & Lord,  
47 Marylebone Lane, London W1M 6DL

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F4R

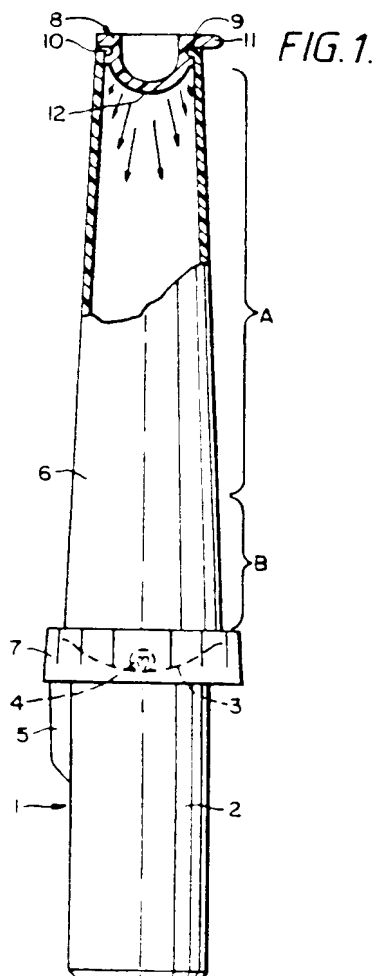
A6S

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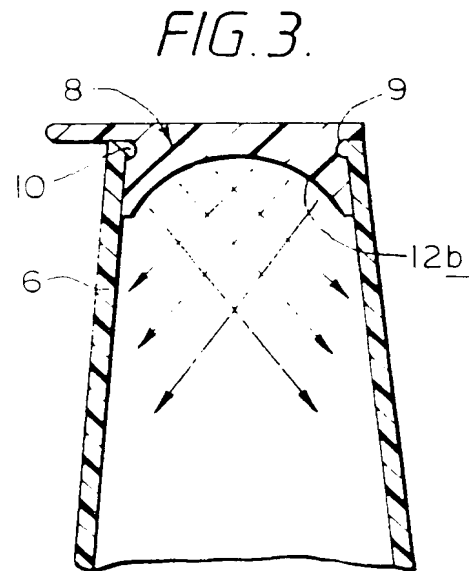
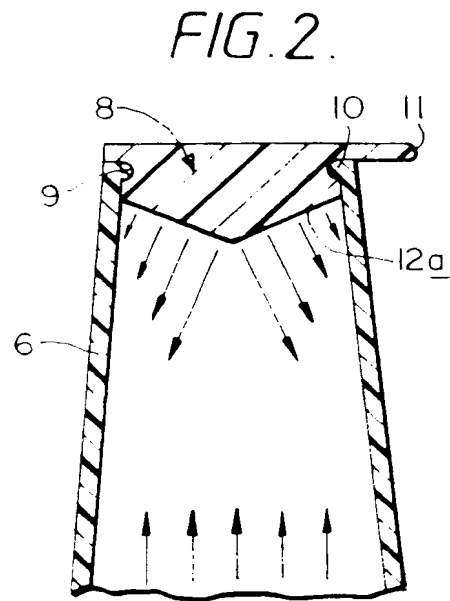
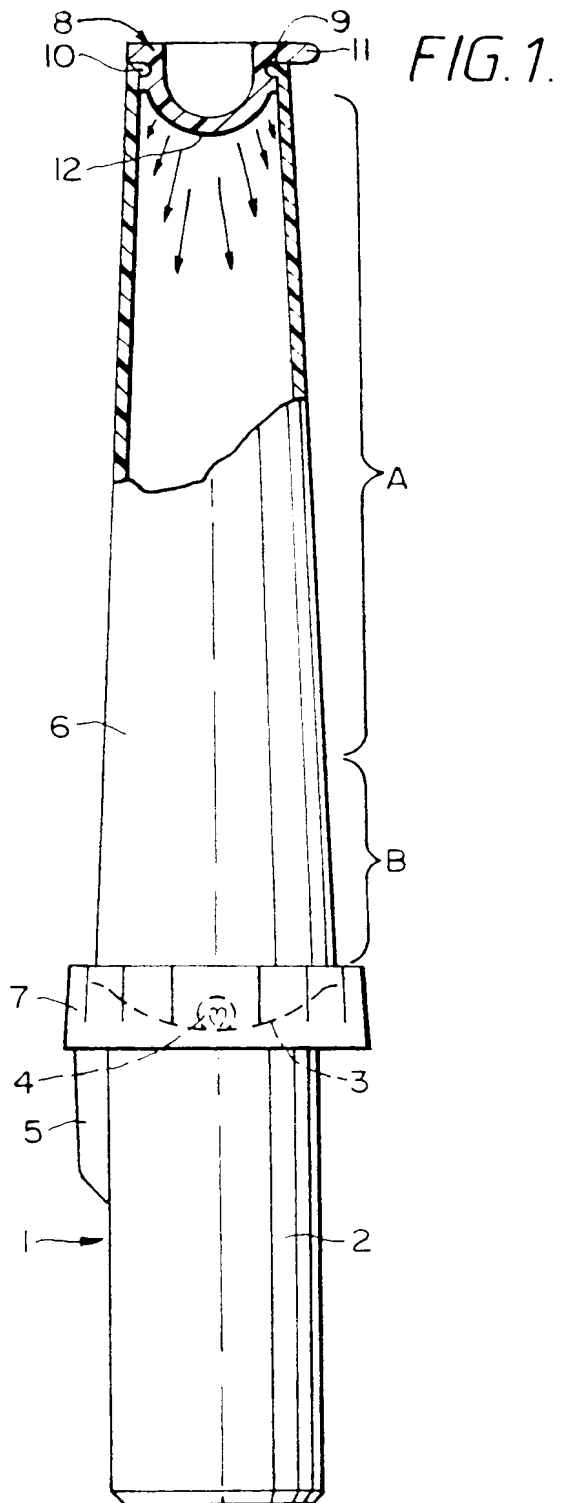
Selected US specifications from IPC sub-class F21L

## (54) Portable light device

(57) A self contained and portable light device has a main body 1 to which is fitted a translucent light tube 6. Light from the torch bulb 4 is directed into the tube 6 for illuminating the wall of the tube. An end cap 8 is fitted to the tube 6 and has a mirror surface 12 which is contoured to direct light from the bulb 4 on to the interior of the tube 6. The surface 12 can be of concave or convex form with respect to the bulb 4 and may be part spherical, parabolic, hyperbolic, conical or faceted.



GB 2 166 860 A



## SPECIFICATION

**A self contained and portable light device****5 TECHNICAL FIELD AND BACKGROUND ART**

This invention relates to a self contained and portable light device which is intended to be hand held and, when illuminated, may be waved or otherwise manoeuvred for purposes of directional control or merely carried as a safety light. The invention is particularly applicable to light devices of the kind having a housing for a power source and which housing has a tube of translucent material extending therefrom so that a light source carried by the housing directs light into the tube to illuminate the side wall thereof. The light tube is usually formed of a brightly coloured plastics so that when illuminated is easily visible especially in the dark. Previously proposed devices of the aforementioned kind are frequently employed, for example by Police in vehicular traffic control and by groundstaff in the directional control of aircraft and are becoming increasingly popular for motorists to carry as a safety light in the event of a breakdown and in hazardous road condition, for example when walking along a motorway.

The housing and light source of the known light devices is usually provided by a battery powered heavy duty torch or flashlight to which the translucent light tube is fitted; consequently the light intensity which is available from the bulb of the torch is limited and efficient use should be made of the available light for illuminating the tube relatively uniformly over its length. In prior proposals the light from the bulb is directed into the tube from a conventional dish-shaped reflector within which the bulb is mounted—this has the effect of providing greater tube illumination towards the end thereof adjacent the light source. It is an object of the present invention to provide a light device of the kind mentioned above which will provide improved illumination characteristics for the light tube particularly in the region of the tube remote from the light source.

**50 STATEMENT OF INVENTION AND ADVANTAGES**

According to the present invention there is provided a self contained and portable light device comprising a housing for a power source; and light tube having a side wall of translucent material, said tube being connected at one end to the housing; a light source capable of being energised by the power source and mounted to direct light into the tube from said one end and wherein the light tube has an end wall which is remote from and opposes said light source, the end wall carrying a non-flat reflective surface which is contoured to direct light reflected from the source over the interior surface of the side

wall.

By the present invention it is intended that the reflective surface of the end wall will be contoured so that the light reflected therefrom and which is transmitted by the light source will predominantly be directed on to the interior surface of the light tube over a length of that tube remote from the end of the tube which is adjacent to the light source (so that the tube will be illuminated more uniformly than previously proposed devices). As mentioned above, in conventional devices of the kind to which the present invention relates where the light source and housing are in the form of a conventional heavy duty torch, the dish-shaped reflector within which the torch bulb is mounted throws light directly on to a relatively short part length of the tube which is nearest to the light source so that the brightness of the tube progressively decreases along its length from the light source. In some prior proposals having this latter construction there is provided an end wall on the tube which opposes the light source and which is of the same translucent material as the tube, an example of such a device is that sold under the Trade Mark "SAFETY—GLO WAND". With such a translucent material the end wall will be illuminated from the light source so that the overall effect is to provide the tube with a bright end adjacent the light source, a bright end remote from the light source and a relatively dull central region. By appropriately contouring the reflective surface on the end cap in accordance with the present invention the central region may be illuminated by the light which is reflected from the end wall to provide a desired substantially uniform illumination over the length of the tube.

The reflective surface of the end wall can be contoured to be of a concave or convex general form with respect to the light source. This concave or convex form is preferably provided by a substantially smooth and uninterrupted reflective surface such as a part spherical, hyperbolic, parabolic or conical profile although it may be provided by several reflective faces which present a faceted profile.

Preferably the reflective surface on the end wall has a mirror or silvered finish and may be adhesively secured to the wall or electrochemically or otherwise deposited thereon.

The light tube will usually have a straight or tapering side wall of circular form in radial section and preferably the light source and the reflective surface on the end wall are symmetrically disposed with respect to the longitudinal axis of such a light tube so that the light which is reflected from the reflective surface is directed symmetrically around the inner surface of the tube wall to provide the desired uniform illumination.

Preferably the end wall is in the form of a cap which engages with the side wall of the

tube. Such an end cap may be removable so that a beam of light from the source and directed through the tube is available for general illumination purposes.

5

#### DRAWINGS

One embodiment of a light device constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying illustrative drawings, in which:

Figure 1 is a side view of the device in part section to show an end cap having the reflective surface fitted to the tube, and

Figures 2 and 3 illustrate modified forms of end caps and reflective surfaces for the device in Fig. 1.

#### DETAILED DESCRIPTION OF DRAWINGS

The light device shown in Fig. 1 is intended to be hand held and a substantial part 1 is in the form of a conventional heavy duty torch or flashlight comprising battery housing 2 carrying a dish-shaped reflector 3 within which is mounted a light bulb 4 energised by the batteries. An on/off switch 5 is provided on the housing 2.

Carried by the housing 2 is a circular sectioned frusto conical light tube 6 of translucent material. Typically the tube 6 will be moulded in plastics (such as polyethylene), be of a bright colour such as yellow, orange or red and have the dimensions in the order of 20 cms length and a diameter of 4 cms tapering to 3.5 cms. The tube 6 is fitted to the housing 2 with its axis symmetrically disposed relative to the reflector 3 and on the bulb 4 and is conveniently retained by a screw threaded collar 7 on the housing engaging over an external annular flange (not shown) on the tube.

The bulb 4 and reflector 3 direct light into the end of the tube adjacent the housing 2.

The end of the tube remote from the bulb 4 is closed by a cap 8. This cap provides an end wall to the tube and may be formed as a hollow plastics moulding. The cap 8 is fitted to the wall of the tube 6 by an annular recess 9 in the cap co-operating with an annular internal flange 10 at the end of the tube 6. The recess and flange 9, 10 are preferably snap engageable so that the cap 8 can be readily fitted to and removed from the tube, a tag 11 is provided on the cap to facilitate its removal. The end cap 8 carries a reflective surface 12 which is in the form of a mirror (or substantially so) that opposes the light bulb 4. The reflective surface 12 which may be formed by the natural surface of the material of the end cap, by chemical deposition on the material of the end cap, by a coating or by a silvered or mirrored layer adhesively secured to the end cap, is contoured to reflect light from the bulb 4 and to direct such light on to the interior surface of the wall of the tube 6,

predominantly over the part length of that tube indicated at A. The part length of the tube adjacent to the housing 2 and indicated at B will predominantly be illuminated by light which is directed from the dish-shaped reflector 3. Desirably the reflective surface 12 is contoured so that there is a substantially uniform illumination of the tube wall both over its length and around its circumference (although it is appreciated that the illumination will inevitably decrease in intensity as the distance from the bulb 4 increases).

In the embodiment shown in Fig. 1 the surface 12 is of convex form with respect to the bulb 4 and is part spherical, hyperbolic or parabolic symmetrical with the axis of the tube to provide the required light dispersal.

In the modification shown in Fig. 2 the reflective surface of the end cap 8 is again of generally convex form, in this case being of conical profile 12a to provide the required light dispersal.

The end cap 8 in the modification shown in Fig. 3 has a reflective surface of concave form 12b with respect to the bulb 4. This form 12b is illustrated as of generally hyperbolic, parabolic or part spherical form although it will be appreciated that a conical form can be provided to provide the required light dispersal.

95

#### CLAIMS

1. A self contained and portable light device comprising a housing for a power source; a light tube having a side wall of translucent material, said tube being connected at one end to the housing; a light source capable of being energised by the power source and mounted to direct light into the tube from said one end and wherein the light tube has an end wall which is remote from and opposes said light source, the end wall carrying a non-flat reflective surface which is contoured to direct light reflected from the source over the interior surface of the side wall.

2. A device as claimed in claim 1 in which a dish-shaped reflector is provided to direct light from the source into said one end of the tube to directly and predominantly illuminate part length of the tube side wall adjacent to the light source and the reflective surface on the end wall is contoured to direct light predominantly for illuminating part length of the tube side wall remote from the light source.

3. A device as claimed in either claim 1 or claim 2 in which the side wall of the tube when illuminated has a brightness which is substantially uniform.

4. A device as claimed in any one of the preceding claims in which the reflective surface on the end wall is contoured to be of generally concave or convex form with respect to the light source.

5. A device as claimed in claim 4 in which the concave or convex surface is substantially smooth and un-interrupted.

6. A device as claimed in claim 5 in which the reflective surface is part spherical, hyperbolic, parabolic or conical.
7. A device as claimed in any one of claims 1 to 4 in which the reflective surface on the end wall is provided by several reflective faces which present a faceted profile.
8. A device as claimed in any one of the preceding claims in which the reflective surface on the end wall has, or substantially so, a mirror finish.
9. A device as claimed in any one of the preceding claims in which the reflective surface on the end wall is provided by a reflective layer deposited on, or adhesively secured to, that wall.
10. A device as claimed in any one of the preceding claims in which the end wall is removably fitted to the side wall.
11. A self contained and portable light device substantially as herein described with reference to the accompanying illustrative drawings.

